

Hannah M. McMillan

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EDUCATION

Duke University, Durham, NC (August 30, 2021)
Ph.D. in Molecular Genetics and Microbiology
Certificate in Cell and Molecular Biology
Certificate in College Teaching

Davidson College, Davidson, NC (May 17, 2015)
Bachelor of Science in Biology
Magna Cum Laude, Honors in Biology
Minor in Dance

RESEARCH AND PROFESSIONAL EXPERIENCE

- 2021-present** **Duke University Department of Biological Sciences**, Durham, NC
Postdoctoral Research Associate, Sheng Yang He Lab
Projects: Uncovering the mechanisms of temperature-dependent microbiome x plant emergent phenotypes; Characterizing the roles of plant extracellular vesicles in interkingdom communication between plant and microbiome communities.
- 2015-2021** **Duke University Department of Microbial Genetics and Microbiology,**
Program in Cell and Molecular Biology, Durham, NC
Graduate Research Assistant, Meta Kuehn Lab
Projects: Defining the role of *Pseudomonas* outer membrane vesicles in plant infection; NSF Convergence RAISE Grant Collaboration: Harnessing extracellular vesicle mediated interkingdom communication.
- 2014-2015** **Duke University Department of Biological Sciences**, Durham, NC
Undergraduate Research Assistant, Xinnian Dong Lab
Projects: Profiling Calcium Dynamics in *Arabidopsis thaliana* during Effector Triggered Immunity; Developing Stably Expressing Mutant Lines using the CRISPR Targeted Genome Editing System in *Arabidopsis thaliana*.
- 2013-2014** **Davidson College Department of Biology**, Davidson, NC
Undergraduate Research Assistant, Karen Hales Lab
Project: Characterization of mitochondrial phenotypes in *Drosophila melanogaster* PINK1 and Parkin overexpression lines during spermatogenesis.
- Summers** **Duke University Department of Biological Sciences**, Durham, NC
2010-2013 *High School/Undergraduate Research Assistant, Xinnian Dong Lab*
and Winters Projects: Bimolecular Fluorescence Complementation in *Arabidopsis thaliana* and *Escherichia coli*; Characterization of protein pathways and protein interactions using yeast two-hybrid techniques in *Saccharomyces cerevisiae*; Exploring the relationship between the circadian clock and plant immunity in *Arabidopsis thaliana*.
2011-2013

PUBLICATIONS | ORCID: 0000-0003-0926-5198

- 2021** **MCMILLAN, H. M.**, ZEBELL, S. G., RISTAINO, J. B., DONG, X. & KUEHN, M. J. 2021. Protective Plant Immune Responses are Elicited by Bacterial Outer Membrane Vesicles. *Cell Reports*, 34(3).
- 2021** **MCMILLAN, H. M.** and KUEHN, M.J. 2021. The Extracellular Vesicle Generation Paradox: A Bacterial Point of View. *The EMBO Journal*, 40(21): e108174.
- 2021** **MCMILLAN, H. M.**, ROGERS, N., WADLE, A., KUEHN, M. J., HSU-KIM, H., WIESNER, M. R., HENDREN, C. O. 2021. Microbial Vesicle-Mediated Communication: Convergence to Understand Interactions Within and Between Domains of Life. *Environmental Science: Processes and Impacts*, 23(5): 664-677.
- 2022** **MCMILLAN, H.M.** and KUEHN, M.J. 2022. Proteomic Profiling Reveals Distinct Bacterial Extracellular Vesicle Subpopulations with Possibly Unique Functionality. *Applied and Environmental Microbiology*, 89(1): e01686-01622.

- 2022 ROGERS, N. M. K., MCCUMBER, A. W., MCMILLAN, H. M., MCNAMARA, R. P., DITTMER, D. P., KUEHN, M. J. HENDREN, C. O., WIESNER, M. R. 2022. Comparative Electrokinetic Properties of Extracellular Vesicles Produced by Yeast and Bacteria. *Colloids and Surfaces B: Biointerfaces*, 225: 113249.
- 2023 MCMILLAN, H. M. 2023. Sec14-like proteins to the rescue: Improving plant performance in low phosphate conditions. *Plant Physiology*, 192(4): 2588–2590.
- 2023 MCMILLAN, H. M. 2023. New receptors for common MAMPs: Can wild relatives save citrus from disease? *Plant Physiology*, 193(1): 162-165.
- 2023 MCMILLAN, H. M. 2023. Plants target gut microbes to reduce insect herbivore damage. *PNAS*, 120(28): e2308568120.
- 2024 MCMILLAN, H. M. 2024. In the face of climate change, will trees be...shorter? *Plant Physiology*, 194(3): 1279-1281.
- 2024 MCMILLAN, H. M. 2024. Lipid droplets: New roles as mediators of biotic and abiotic stress. *Plant Physiology*, 00: 1-3.
- 2024 KITHAN-LUNDQUIST, R., MCMILLAN, H.M., HE, S.Y., SUNDIN, G.W. 2024. Temporal fruit microbiome and immunity dynamics in post-harvest apple (*Malus x domestica*). (In Review, *Horticulture Research*)
- 2024 KITHAN-LUNDQUIST, R., MCMILLAN, H.M., HE, S.Y., SUNDIN, G.W. 2024. Microbial community succession and dynamics during the season-long development of apple fruit (*Malus x domestica*). (In Preparation, *Phytobiomes Journal*)
- 2025 MCMILLAN, H.M., RODRIGUEZ, B.V., KUEHN, M.J. 2025. Bacterial OMV/MV Purification, Characterization, and Infiltration into Plants. (In Preparation, *STAR Protocols*)
- 2025 MCMILLAN, H.M., KUEHN, M.J. 2025. Large-scale Metabolomics Analysis Uncovers Plant-active Molecular Cargo in Bacterial Extracellular Vesicles. (In Preparation)

FELLOWSHIPS and ACADEMIC HONORS

- 2024 Mitchell Meritorious Research Travel Award (\$1000).
- 2022-2024 NSF Postdoctoral Research Fellowship in Biology Award 2208939 (\$138,000).
- 2023 Presentation Award *International Conference on Arabidopsis Research*
- 2023 NAASC ICAR Travel Award (\$1000)
- 2021 Office of Biomedical Graduate Education Professional Development Award (\$450).
- 2020 Young Investigator Award *American Society for Exosomes and Microvesicles* (\$400).
- 2019 Mitchell Meritorious Research Travel Award (\$1000).
- 2019 Poster Award *Symposium on Food Systems, Nutrition, and the Microbiome*.
- 2019 Shimamoto Travel Award *ISMPMI* (\$1500).
- 2019 Kamin Travel Fellowship (\$400).
- 2019 Duke Graduate School Conference Travel Award (\$525).
- 2018 Best Talk Award *Molecular Genetics and Microbiology Departmental Retreat*.
- 2018 Poster Award *Innate Immunity, Inflammation, and Disease Symposium*.
- 2018 Kamin Travel Fellowship (\$400).
- 2018 Additional Kamin Travel Fellowship (\$400).
- 2018 Duke Graduate School Conference Travel Award (\$525).
- 2017 Mitchell Meritorious Research Travel Award (\$1000).
- 2015 Sigma Xi Grants in Aid of Research (\$300).
- 2015 Phi Beta Kappa Society *Davidson College Gamma Chapter*
- 2015 Sigma Xi Award *Davidson College*
- 2015 Chancellor's Scholars Fellowship *Duke University*
- 2013 GlaxoSmithKline Women in Science Scholarship *Davidson College*

TEACHING AND MENTORING

- Fall 2024** **Undergraduate Independent Study Mentor**, *Joshua Gilmer, He Lab*
Project: bacterial mechanism of cuticle degradation at elevated temperature
- Spring 2024** **Undergraduate Independent Study Mentor**, *Cat Xia, He Lab*
Project: pathogen evolution at elevated temperature
- Spring 2024** **Undergraduate Student Researcher Mentor**, *Joshua Gilmer, He Lab*
Project: bacterial colonization effect on plant cuticle integrity at elevated temperature
- Fall 2022** **Graduate Student Rotation Mentor**, *Rachel Loney, He Lab*
Project: pathogen evolution at elevated temperature
- Fall 2021** **Graduate Student Rotation Mentor**, *Paula Collado Cordon, He Lab*
Project: impact of salt and pH stress on plant immune signaling
- Fall 2020** **Graduate Student Rotation Mentor**, *Alex Hofler, Kuehn Lab*
Projects: biochemical fractionation of *Pseudomonas aeruginosa* vesicles and characterization of their immunogenicity in plants
- 2017-2020** **Lesson Plan Developer**
The Scientific Research and Education Network, Raleigh, NC
Responsibilities: Design lesson plan for NC educators to implement in classrooms
- Fall 2019** **Graduate Student Rotation Mentor**, *George Georgiou, Kuehn Lab*
Projects: surface properties of bacterial vesicles and biotin labeling
- Spring 2019** **Teaching Assistant, Microbial Pathogenesis**
Duke University Molecular Genetics and Microbiology Department, Durham, NC
Responsibilities: Lead four paper discussion sessions, write and grade exam questions
- Spring 2019** **Graduate Student Rotation Mentor**, *Zeni Ramirez, MS and Clariss Limso, MS, Kuehn Lab*
Projects: bacterial vesicle interaction with the plant cell wall (ZR) and within biofilms (CL)
- 2018-2019** **Preparing Future Faculty Fellow**
Duke University Graduate School, Durham, NC and NC State University Department of Biology, Raleigh, NC
Mentor: Jean Ristaino, Ph.D.
- Spring 2018** **Teaching Assistant, Introductory Biochemistry I**
Duke University Department of Biochemistry, Durham, NC
Responsibilities: Lead two recitation sessions, hold two office hours per week, grade exams
- Spring 2018** **Microbiology Workshop Designer**
Catalyst Program for Students with Disabilities Saturday Workshop, Raleigh, NC
Responsibilities: Design lesson plan and teach workshop to Catalyst students
- 2016-2018** **Outreach Coordinator and Curriculum Developer**
Molecular Genetics and Microbiology Department Outreach, Durham, NC
Responsibilities: Design new curriculum for activities, plan ~10 events per year, organize volunteers, secure funding for activities and supplies
- 2012-2015** **Biology and Chemistry Tutor**
Math and Science Center at Davidson College, Davidson, NC
Responsibilities: Teaching assistant for Plant Biology course, hold weekly drop in tutoring hours for all courses in biology; introductory, and organic chemistry

LEADERSHIP EXPERIENCES

- 2022-present** **Duke-UNC Plant Lab Networking Organizer** *Duke University Biology Department He Lab and UNC Chapel Hill Biology Department Dangl Lab*
- 2022-2024** **Co-Chair Climate Plant Innovation Center Series** *Duke University Biology Department*
- 2021-2024** **Professional Development Workshop Series Organizer** *Duke University He Lab*
- Oct. 2023** **CPIC Fall Symposium Organizer** *Duke University Climate Plant Innovation Center*
- Jan. 2023** **Microaggressions Workshop Organizer** *Duke University Biology Department He Lab*

2021-2023	Alumni Advisor Campus Pantry Collaborative <i>Duke GPSG Community Pantry</i>
Oct. 2022	Finding Funding Workshop Organizer <i>Duke University Biology Department He Lab</i>
April 2022	Agricultural Technology Industry Career Panel Organizer <i>Duke Biology Plant Labs</i>
2020-2021	Duke Student Alumni Board <i>Duke University Alumni Association</i>
2020-2021	Co-Chair Campus Pantry Collaborative <i>Duke University GPSC Community Pantry</i>
2018-2021	Bacterial Pathogenesis Symposium Organizer <i>Duke CHoMI Supergroup</i>
2018-2021	Campus Food Insecurity Symposium Organizer <i>Duke-UNC CPC Initiative</i>
2018-2021	Laboratory Safety and Chemical Hygiene Officer <i>Duke University Kuehn Lab</i>
2017-2021	Operations and Donations Volunteer <i>Duke GPSC Food Pantry</i>
2019-2020	Chair of Resource Directory Task Force <i>Graduate and Professional Student Council</i>
Spring 2019	Emerging Leaders Institute <i>Duke University Graduate School</i>
2018-2019	Director of Community Outreach <i>Executive Board Duke GPSG</i>
2018-2019	Outreach Coordinator <i>Duke Biochemistry Department Graduate Student Council</i>
2017-2018	Cell and Molecular Biology Representative <i>Graduate and Professional Student Council</i>
Spring 2017	Panelist Recruiter and Event Coordinator <i>Alternative Career Panel</i>
2016-2017	Content Developer <i>Cell and Molecular Biology Website Committee</i>

PRESENTATIONS

CONFERENCES

Sept. 2024	McMillan HM, He SY. “Microbiota alter plant leaf epidermal properties at elevated temperature.” <i>6th International Symposium on Plant Apoplastic Diffusion Barriers (PADiBa). Girona, Spain. (Speaker selected from abstracts and Poster)</i>
June 2024	McMillan HM, He SY. “Microbiome colonization leads to emergent plant phenotypes at elevated temperature.” <i>ASPB: Plant Biology 2024. Honolulu, HI. (Poster)</i>
June 2024	McMillan HM, He SY. “Microbiota colonization leads to emergent plant phenotypes at elevated temperature.” <i>New Phytologist: Next Generation Scientists. Durham, NC. (Speaker selected from abstracts)</i>
Nov. 2023	McMillan, HM, He SY. “Microbiome colonization leads to emergent plant phenotypes at elevated temperature.” <i>NC-ASM. Durham, NC. (Special Topics Speaker)</i>
Aug. 2023	McMillan HM, He SY. “Climate impact on plant-pathogen interactions.” <i>ASPB: Plant Biology 2023. Savannah, GA. (Concurrent Session Speaker)</i>
Aug. 2023	McMillan HM, He SY. “Microbiome colonization leads to emergent plant phenotypes at elevated temperature.” <i>ASPB: Plant Biology 2023. Savannah, GA. (Lightning Talk Presenter and Poster)</i>
July 2023	McMillan HM, He SY. “Microbiome colonization leads to emergent plant phenotypes at elevated temperature.” <i>2023 Congress of the International Society for Molecular Plant Microbe Interactions. Providence, RI. (Poster)</i>
June 2023	McMillan HM, He SY. “Microbiome colonization leads to emergent plant phenotypes at elevated temperature.” <i>33rd International Conference on Arabidopsis Research. Chiba, Japan. (Speaker selected from abstracts and Poster)</i>
May 2022	McMillan HM, Zebell S, Ristaino JB, Dong X, Kuehn MJ. “Bacterial vesicles elicit protective plant immune responses and could have unexplored implications for microbiome function.” <i>2022 Pennsylvania State University: The Changing Microbiomes Symposium. Boalsburg, PA. (Poster)</i>
Nov. 2020	McMillan HM, Zebell S, Dong X, Kuehn MJ. “Bacterial Vesicles: Vehicles for Inter-kingdom Communication and Modulators of Plant Immune Response.” <i>2020 Annual Meeting of the American Society for Exosomes and Microvesicles. Virtual. (Speaker selected from abstracts)</i>
July 2020	McMillan HM, Zebell S, Ristaino JB, Dong X, Kuehn MJ. “Bacterial Vesicles Elicit Protective Plant Immune Responses.” <i>ASPB: Plant Biology 2020. Virtual. (iPoster)</i>
Jan. 2020	McMillan HM, Zebell S, Dong X, Kuehn MJ. “Bacterial vesicles: double agents for plant defense.” <i>North Carolina State University Emerging Plant Disease Symposium. Raleigh, NC. (Poster)</i>
July 2019	McMillan HM, Zebell S, Dong X, Kuehn MJ. “Bacterial vesicles: double agents for plant defense.” <i>Gordon Research Conference: Microbial Adhesion and Signal Transduction. Newport, RI. (Poster)</i>

- July 2019** **McMillan HM**, Zebell S, Dong X, Kuehn MJ. “Bacterial vesicles: double agents for plant defense.” *XVII Congress of the International Society for Molecular Plant Microbe Interactions. Glasgow, Scotland. (Poster)*
- June 2018** **McMillan HM**, Kuehn MJ. “Small Vesicles Pack a Big Punch: Bacterial Outer Membrane Vesicles Activate Plant Immune Responses.” *American Society for Microbiology: Microbe. Atlanta, GA. (Poster)*
- Mar. 2018** **McMillan HM**, Kuehn MJ. “Bacterial Vesicles as Novel Plant Immune Activators: Plants Take the W in the Fight for Defense Response.” *Cells vs. Pathogens: Intrinsic Defenses and Counterdefenses. Monterey, CA. (Poster)*
- Sept. 2017** **McMillan HM**, Dong X, Kuehn MJ. “Bacterial vesicles: novel plant immune activators.” *Bayer Crop Science 3rd Research Symposium. Durham, NC. (Poster)*
- June 2017** **McMillan HM**, Kuehn MJ. “A novel OMV-mediated bacterial mechanism for plant innate immune activation.” *ASM: Microbe. New Orleans, LA. (Poster)*
- Aug. 2014** **McMillan HM**, Zebell S, Dong X, Ph. D. “Profiling Calcium Dynamics during Effector Triggered Immunity.” *28th Annual Plant Molecular Biology Retreat. Wrightsville Beach, NC. (Chalk Talk)*

SELECTED POSTERS AND ADDITIONAL PRESENTATIONS

- Nov. 2023** Developmental, Cellular, and Molecular Biology Seminar Series (*Speaker*)
- Oct. 2023** Biology Department Seminar Series (*Speaker*)
- Aug. 2021** Dissertation Presentation (*Speaker*)
- Oct. 2020** Society of Duke Fellows (*Seminar Speaker*)
- Oct. 2020** Cell Host and Microbial Interactions Supergroup: Bacterial Pathogenesis Symposium (*Flash Talk Speaker*)
- Nov. 2019** Symposium on Food Systems, Nutrition, and the Microbiome (*Poster*)
- Feb. 2019** Cell and Molecular Biology Program Recruitment (*Requested Flash Talk Speaker*)
- Dec. 2018** Duke University Cell and Molecular Biology Student Symposium: Proteins, to Pathways, to Patients (*Invited Speaker*)
- April 2018** Women in Science Symposium (*Poster*)
- Mar. 2018** University of California Berkeley (*Invited Seminar Speaker*)
- Feb. 2018** Cell and Molecular Biology Program Recruitment (*Requested Flash Talk Speaker*)
- April 2017** Women in Science Symposium (*Poster*)

SYNERGISTIC ACTIVITIES

PROFESSIONAL SERVICE

- 2023-2024** Davidson College Class of 2015 Ambassador
- 2023-2024** Assistant Features Editor, *Plant Physiology*
- 2024** Reviewer for *Trends in Microbiology, Science*
- 2023** Speed Networking Session Panelist, ISMPMI
- 2023** Reviewer for *Microbiology Spectrum, PNAS, Research in Microbiology*
- 2022** Reviewer for NSF
- 2021** Reviewer for *MPMI, Science*
- 2018** Reviewer for *Biochimie*
- 2017** Reviewer for *PLOS Pathogens, The Plant Journal*

COLLABORATIVE EFFORTS

- 2022-present** Predictive Modeling Collaboration Pixu Shi, Ph.D.
- 2022-present** Apple Microbiome Bioinformatics Analysis Roselane Kithan-Lundquist
- 2018-2023** VESICLE Collaboration Funded 2019-present NSF Convergence RAISE initiative (Grant 1931309; \$1,000,000)
- 2020-2024** PNNL-EMSL Collaboration EMSL Project 51425 (\$83,995)



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PROFESSIONAL DEVELOPMENT

- May 2024** North Carolina Microbiome Symposium (*NC Biotech Center*)
- Sept. 2023** Creating Your DEI Statement (*Duke Office of Postdoctoral Services*)
- May 2023** North Carolina Microbiome Symposium (*NC Biotech Center*)
- Feb. 2023** Communicating Your Research Through Storytelling (*Duke Office of Postdoctoral Services*)
- Feb. 2023** How to Build a Diverse and Inclusive Academic Space (*Plantae Presents, ASPB*)
- Nov. 2022** Quantitative Biology of the Microbiome Symposium (*Duke Center for Quantitative Biodesign, Duke Microbiome Center, Precision Microbiome Engineering Research Center*)
- May 2022** Microbiome/Metagenome Analysis Workshop (*Duke Microbiome Center*)
- June 2021** Machine Learning Summer School (*Duke + Data Science*)

PROFESSIONAL SOCIETIES

- 2015-present** Phi Beta Kappa
Member
- 2023-present** ASPB
Member